Laboratory Environment Safety and Health Committee

MINUTES OF MEETING 03-02

June 5, 2003

FINAL

Committee Members Present	Committee Members Absent
R. Beuhler	R. Lee*
G. Flett (for M. Fallier)	
R. Gill	
T. Ginsberg	
J. W. Glenn	
W. Gunther	
H. Kahnhauser*	
E. Lessard (Chairperson)	
R. Travis* (Secretary)	
O. White	
(* non-voting)	

Visitors
R. Karol
Y. Makdisi

Agenda:

1. **Collider- Accelerator Department - Accelerator Safety Envelope Modifications**
2. **Proposed Guidelines and R2A2 for the Laboratory Environmental, Safety and Health Committee**

Minutes of Meeting: Appended on pages 2 through 4.

ESH COMMITTEE MINUTES APPROVED:

Signature on File
E. Lessard
LESHC Chairperson

DH50QR

Chairperson E. Lessard called the second meeting in 2003 of the Laboratory Environmental Safety and Health Committee (LESHC) to order on June 5, 2003 at 3:08 p.m.

1. Collider- Accelerator Department - Accelerator Safety Envelope Modifications:

1.1. E. Lessard invited R. Karol to present the proposed modifications to the C-AD ASEs. (The presentation and the review material that was transmitted to the Committee are attached to these minutes.)

1.2. Mr. Karol and other members of the Collider-Accelerator Department made the following points during the course of the presentation and in response to specific Committee questions:

1.2.1. C-AD QA has reviewed the documentation package that was submitted to the Committee and certifies that the changes described in the summary memo (Attachment 2) accurately reflect the scope of the modifications contained in the modified ASEs (Attachments 3 – 6).

1.2.2. Although it is an accepted practice for DOE Reactor Facilities, the Accelerator Safety Order neither prescribes nor prohibits the use of "Authorized Alternatives". However, the SBMS guidance for an ARR indicates "The procedures addressing the ASE-required equipment and systems specify the minimum necessary system components and monitoring devices to allow operation. If these minimums are not met, actions are specified."

1.2.3. The equivalence of the "Authorized Alternative" to the corresponding ASE requirement was the subject of some discussion. C-AD acknowledged that the entry into an Authorized Alternative might pose a slight decrease in safety; however they do not consider it to be significant.

1.2.4. The Committee stated that the amount and depth of the Authorized Alternatives would seem to indicate that the affected systems are not that reliable. C-AD noted that reactor facilities can have the equivalent of authorized alternatives for all of their safety systems.

1.2.5. In response to the Committee concern about the frequent use of the authorized alternatives, C-A committed to present a critique to C-A Department Management whenever an alternative was exercised.

1.2.6. There was some question whether the proposed 25% extension allowance for surveillances is appropriate for radiation monitoring equipment under DOE Order 835. C-AD and the LESHC Committee member from RCD agreed to research this question - **Complete**[1].

1.2.7. The Committee noted that Section 2 of each ASE, "BNL Safety Envelope Limits" provides quantitative limits with the exception of groundwater contamination. C-AD committed to explicitly state the tritium and sodium-22 concentration limits as 5% of the Drinking Water Standard and to reference the Accelerator Safety Subject Area, "Design Practice for Known Beam Loss Locations" – **Complete**[1].

[1] This action was completed during the review cycle for these minutes

1.2.8. In response to a Committee request, C-AD agreed to clarify the intent of Section 3.14 of the RHIC ASE – **Complete**[1].

1.2.9. An operating procedure will be drafted to specify the compensatory actions if either the STAR or PASS Flammable Gas Detection Systems are inoperable (RHIC ASE Section 3.15.1). C-AD committed to involve the BNL Fire Safety Engineer (Joe Levesque) in the procedure development and to provide the LESHC with an information copy of the procedure in parallel with the ASE approval process.

1.2.10. C-AD committed to edit the documents to ensure consistency among the ASEs and to revise the RHIC ASE to: clarify the meaning of "detector" in (Sections 3.15.1 and 3.16.1), indicate that either of the two detectors must be operable (Section 3.17.2), and to clarify the operability parameters for the tunnel exhaust fans (Section 3.14) – **Complete**[1].

1.3. The following motion was crafted by the Committee:

1.3.1. Motion 1: The Committee recommends the approval of the modified Accelerator Safety Envelope documents subject to the following conditions. C-A will:

- Present a critique to their departmental management whenever an authorized alternative was exercised.
- Determine if the proposed 25% extension allowance for surveillances is appropriate for radiation monitoring equipment
- Modify Section 2 of each ASE to explicitly state the tritium and sodium-22 concentration limits as 5% of the Drinking Water Standard and to reference the Accelerator Safety Subject Area, "Design Practice for Known Beam Loss Locations" – **Complete**[1].
- Provide an information copy of the operating procedure to the LESHC in parallel with the ASE approval process. (See 1.2.9, above.)

1.3.2. Recommendation for Approval of the motion was made by O. White.

1.3.3. Seconded by T. Ginsberg.

1.3.4. The motion was approved by vote of six in favor and none opposed. (E. Lessard and W. Glenn abstained.)

2. Proposed Guidelines and R2A2 for the Laboratory Environmental, Safety and Health Committee:

2.1. E. Lessard discussed his review of Laboratory documents that pertain to the LESHC. In certain cases the documents provide conflicting information, or do not accurately reflect the way the Committee conducts business. The purpose of

the "Proposed Guidelines and R2A2 for the Laboratory Environmental, Safety and Health Committee" is to address these concerns.

2.2. The Chairman's introduction was followed by a roundtable discussion.
  2.2.1. E. Lessard volunteered to review the Committee "rules of thumb" (such as the 25 mrem limitation to a facility's neighbors) that have been developed in past meetings and make a recommendation whether or not they should be formalized in these Guidelines.
  2.2.2. R. Travis will investigate whether the Guidelines can be put into SBMS.
  2.2.3. The Committee membership was discussed. There was general agreement that a quantitative membership number was not necessary. There was also some discussion about representation from other Laboratory organizations and the use of "ad hoc" members.
  2.2.4. Several other changes to the document were proposed. They have been added to the attached Guidelines document in track changes format.
2.3. The Committee members agreed to review and comment on the Guidelines document.
2.4. The LESHC secretary will revise the document accordingly.
2.5. The scope and breadth of the Committee comments will determine if additional roundtable discussions are warranted.

3. The Meeting was adjourned at 4:55 p.m.

Attachments

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Managed by Brookhaven Science Associates
for the U.S. Department of Energy

Date: *July 18, 2003*

To: *T. Sheridan, Deputy Director for Operations*

From: *E. Lessard, ETL Chair, BNL Environment, Safety and Health Committee*

Subject: LESHC 03-02, Recommendation for Approval of the Proposed C-A Department's Accelerator Safety Envelope (ASE) Modifications

The BNL ES&H Committee has reviewed the proposed modifications to the Collider-Accelerator Department's active ASEs. They include:

1) Tandem Van de Graaff/Tandem to Booster Transfer Line (TVDG/TTB) ASE
2) Alternating Gradient Synchrotron (AGS), Booster and Linac ASE
3) NASA Space Radiation Laboratory (NSRL) ASE
4) Relativistic Heavy Ion Collider (RHIC) ASE

In our meeting of June 5, 2003, the Committee raised several questions during the course of the review. The C-AD staff addressed all of our questions satisfactorily.

The Meeting Minutes are attached for your information. In summary, the ASEs were revised using the draft DOE Accelerator Safety Guide, as supplemented with the DOE guidance for reactor Technical Safety Requirements, particularly for non radiation hazards, emergency actions, authorized alternatives, and surveillance interval extension allowances. The following lists the major revisions to the four ASEs:

1) The ASEs were reformatted to conform with the SBMS Accelerator Safety requirements
2) For uncontrolled areas and adjacent non-C-AD facilities, several ASEs used the DOE 100 mrem annual dose limit. The BNL administrative control limit of 25 mrem in one year is now specified in all ASEs
3) The RHIC ASE was modified to remove the detailed ODH requirements and a commitment to satisfy the SBMS ODH requirements was inserted
4) Environmental requirements for control of groundwater contamination and airborne release were clarified and made consistent among the ASEs
5) The Experimental Review requirement was added to all ASEs
6) A commitment to control industrial hazards in accord with SBMS requirements was added to all ASEs
7) The use of "Authorized Alternatives," to be implemented if an ASE requirement is not met, has been added where appropriate in all of the ASEs. This concept, as it applied to C-AD fire protection systems, was reviewed and approved in LESHC Meeting 03-01
8) A 25% extension allowance on surveillance intervals was added

9) Guidance on ESH emergency actions that depart from ASE requirements was added to all ASEs.

By unanimous vote, the Committee recommends your approval of these documents, subject to the following four conditions. The Collider-Accelerator Department (C-AD) will:

1) Present a critique to their departmental management whenever an authorized alternative is exercised
2) Determine if the proposed 25% extension allowance for surveillances is appropriate for radiation monitoring equipment – **Complete**[1]
3) Modify Section 2 of each ASE to explicitly state the tritium and sodium-22 concentration limits as 5% of the Drinking Water Standard and to reference the Accelerator Safety Subject Area, "Design Practice for Known Beam Loss Locations" – **Complete**[1]
4) Provide an information copy of the operating procedure to the LESHC in parallel with the ASE approval process

Copy to (via Email):

Committee Members
S. Hoey
R. Karol
P. Kelley (BAO)
D. Lowenstein
Y. Makdisi
T. Monahan
J. Tarpinian

[1] Please note that conditions 2 and 3 have been completed in the interim between our June 5th meeting and the date of this letter.

C-A Facility ASEs

Ray Karol

Attachment 1 to LESHC 03-02

Summary of Changes

- The four ASEs were reformatted from their original format to the current SBMS Accelerator Safety format for consistency.
- The AGS, Booster and Linac "ASE", which is currently a DOE-approved C-AD procedure specifying OSLs, was converted to an ASE using this new format.

Summary of Changes

- Added guidance on emergency actions that depart from the approved ASE requirements. This guidance comes into play whenever these actions are not consistent with the ASE requirements and whenever these actions are needed to protect public or worker safety and health or to protect the environment. This is consistent with DOE guidance for reactors.

Summary of Changes

- The requirements were made consistent throughout the four ASEs where possible.
- An example is the limit in uncontrolled areas. Some of the current ASEs limited this to the DOE limit, which is 100 mrem per year. Now the more restrictive BNL ACL of 25 mrem in a year is specified. This has no impact on operations.

Summary of Changes

- Cover pages were updated to include the current BNL administrative positions that approve the ASEs and a Table of Contents was added to link to the ASE sections for ease of use.

Summary of Changes

- The use of "Authorized Alternatives," to be implemented if an ASE requirement is not met has been added where appropriate in all four ASEs. This concept, used in DOE reactor TSRs, was recently implemented in the form of an "Alternative" in the Fire Protection section of a C-AD ASE.

Summary of Changes

- The requirements for ODH in the current RHIC ASE are very detailed. These requirements were simplified by changing to a single requirement that states C-AD will satisfy the SBMS requirements for ODH.

- This change is consistent with the language in the DOE Order on reactor TSRs, which states that TSRs should not contain excessive details that are more appropriate for an SAR. The details for ODH requirements are in the C-AD SADs and OPMs.

Summary of Changes

- Requirements for control of groundwater contamination and for airborne release were clarified and made consistent for the four ASEs.

Summary of Changes

- For the AGS, the limits on particle loss at particular locations, which are used in order to keep the site boundary dose within annual limits, were changed to dose measurements. Dose measurements are easier to track and directly relate to the actual limit.

Summary of Changes

- The 25% extension allowance on surveillance intervals was applied to all ASEs. This allowance is consistent with the current RHIC and NSRL ASEs and with DOE guidance for reactors.

Summary of Changes

- The administrative requirement for review of experiments was added.

- A requirement was added to help assure implementation of SBMS requirements that affect occupational safety and health. This is consistent with DOE guidance for reactor TSRs where the administrative programs for worker safety are just referenced in the TSR.

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Memo

managed by Brookhaven Science Associates
for the U.S. Department of Energy

Date: May 29, 2003

To: E. Lessard, Associate Chair ES&H/QA

From: R. Savage, QA Representative

Subject: C-AD Accelerator Safety Envelopes (ASEs)
Quality Assurance Review

On May 29, 2003, the C-AD Quality Assurance Department was requested to review four C-AD Accelerator Safety Envelopes (ASEs). QA reviewed proposed changes to ensure all pertinent criteria identified in each approved ASE was not removed during the revision process. In addition, to reviewing each ASE for content and accuracy, the Summary of Proposed Changes to C-AD Accelerator Safety Envelopes from R. Karol to E. Lessard, dated May 27, 2003 was reviewed against each ASE to verify all proposed changes were identified and incorporated as stated.

The following four ASEs were reviewed:

- AGS, Booster and Linac ASE
- Relativistic Heavy Ion Collider ASE
- NASA Space Radiation Laboratory (NSRL) ASE
- Tandem Van de Graaff and Tandem to Booster Transfer Line ASE

Based on this review, only minor editorial inconsistencies were found in the ASEs. No unidentified changes in requirements were discovered and the review confirmed that the memorandum from R. Karol to E. Lessard covered all the proposed content changes to the ASEs. The minor editorial comments were marked up in the respective ASE and provided to R. Karol, ESHQ Division Head for review and appropriate action.

Cc: R. Karol
D. Passarello

ATTACHMENT 3 TO LESHC 03-02

Accelerator Safety Envelope

Title of Facility: Tandem Van de Graaff and Tandem to Booster Transfer Line

Date of Initial ASE: December 1, 2001

Subsequent Revision Dates: May 30, 2003

Version of the SAD that the ASE applies to:

~~Tandem Van De Graaff Safety Assessment Document, 10-01-1995,~~ ~~http://www.cadops.bnl.gov/AGS/Accel/SND/tvdg_ttb_usi.htm~~**Safety Analysis Report for the HITL to Booster Line, 10-07-1991**

~~Safety Analysis Report for the HITL to Booster Line, 10-07-1991~~**,** ~~http://www.cadops.bnl.gov/AGS/Accel/SND/tvdg_ttb_usi.htm~~**Tandem Van De Graaff Safety Assessment Document, 10-01-1995**

~~TTB/TVDG Unreviewed Safety Issue, 11-15-2001.~~**, and** ~~http://www.cadops.bnl.gov/AGS/Accel/SND/tvdg_ttb_usi.htm~~**TTB/TVDG Unreviewed Safety Issue, 11-15-2001**

Signature of Preparer:

_____

Signature of Collider-Accelerator Department Chair:

_____

Signature of High Energy and Nuclear Physics Associate Laboratory Director:

_____

Signature of Deputy Director of Operations:

_____

ASE Contents:

Section 1~~.~~: Introduction

~~General actions to be taken upon discovery of a violation of the Safety Envelope:~~
The ASE Requirements define the conditions, safe boundaries, and the administrative controls necessary to ensure safe TVDG/TTB operations and to reduce the potential risk to the public, workers and environment.

~~A variation beyond the boundaries described in Sections 2, 3 and 4 shall be treated as a reportable occurrence, as defined by~~ **1.1 The reference to the method used by the Collider-Accelerator Department for change control of the ASE is the BNL Subject Area on** ~~SBMS~~**Accelerator Safety** ~~Subject Area on Occurrence Reporting. C-A Department staff shall make notifications of occurrences according to the requirements in the C-A Operations Procedure Manual.~~

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~~The method used by the Collider-Accelerator Department for change control of the ASE is documented in the~~ **A variation beyond the boundaries described in Sections 1, 2, 3, and 4 of this ASE shall be treated as a violation of the ASE and shall be a reportable occurrence, as defined by the BNL** ~~C-A Operations Procedure Manual~~**SBMS**~~.~~

1.2 **Subject Area on Occurrence Reporting. A violation is defined as not satisfying a Requirement or its specific Authorized Alternative. C-A Department staff shall make notifications of occurrences according to the requirements in the C-A Operations Procedure Manual.**

1.2.1 **If a Requirement is not satisfied and it has a specific Authorized Alternative, implement the Authorized Alternate or stop the activity that uses the affected equipment within one hour.**

1.3 Emergency actions may be taken that depart from these approved ASE Requirements when no actions consistent with the Requirements are immediately apparent and when these actions are needed to protect the public, worker and environmental safety. These actions shall be approved by the person in charge of facility safety, as defined in the operating procedures, when the emergency occurs and shall be reported to C-AD management within 2-hours.

Section 2: BNL Safety Envelope Limits

This section contains the absolute limits that BNL places on its operations to ensure that we meet the regulatory limits established to protect our environment, public and staff/visitors and that those operations are conducted within the assumptions of the TVDG/TTB safety analyses documented in the TVDG/TTB SADs. BNL Safety Envelope Limits for TVDG/TTB operations are:

2.1. Less than 25 mrem in one year to individuals in other BNL Departments or Divisions adjacent to this Collider-Accelerator Department accelerator facility.

2.2. Less than 5 mrem in one year to a person located at the site boundary.

2.3. Offsite drinking water concentration and on-site potable well water concentration must not result in 4 mrem or greater to an individual in one year.

2.4. Less than 1250 mrem in one year to a Collider-Accelerator Department staff member.

2.5 Groundwater contamination from soil activation ~~is to~~ **shall** be prevented~~.~~ **and controlled in accordance with the requirements of the BNL SBMS Accelerator Safety Subject Area, Design Practice for Known Beam Loss Locations.**

2.6 Airborne effluents from TVDG/TTB facilities shall not result in a dose that exceeds 0.1 mrem in one year to a person at the site boundary **unless the requirements of the BNL SBMS Subject Area, Radioactive Airborne Emissions are satisfied**.

Section 3: Corresponding TVDG/TTB Safety Envelope Parameters

This section identifies the measurable limitations on critical operating parameters that, in conjunction with the specifically identified hazard control considerations established by the facility design and construction, ensure that TVDG/TTB operations will not exceed the corresponding ~~TVDG/TTB~~ Safety Envelope Limits discussed in Section 2. These parameters are derived from the safety analyses described in the **TVDG/TTB** safety assessment documents. TVDG/TTB safety envelope parameters are:

TVDG/TTB Beam Limits

3.1. The limit on the beam extracted from the TVDG or injected into the TTB shall be such that exposure to individuals in uncontrolled areas is less than 25 mrem in one year.

3.2. Beam limits for specific ions shall be proscribed in terms of beam energy and intensity before operations with the specific ion. These limits shall be set in writing by the C-A Department Radiation Safety Committee in order to meet the requirement in 3.1.

Control of Beam Loss

3.3. Loss monitoring results and radiation survey results shall be used in order to maintain beam loss "As Low as Reasonably Achievable" as defined in the BNL Radiological Manual.

3.4. ~~Planned beam~~ **Beam loss induced radiation within uncontrolled areas is to be less than 0.5 mrem in an hour and for repeated losses less than 25 mrem in a year.**

~~**3.4.**~~**3.5.** **Beam** loss induced radiation in an occupied Controlled Area is to be less than 5 mrem in an hour and for repeated losses less than 100 mrem in a year.

Classification of Radiological Areas

3.6 Radiological area classifications during operations shall be in accord with requirements in the BNL Radiation Control Manual.

Access Controls

3.7 The Access Controls System shall be functional during operations with beam.

3.8 During operations with beam, area radiation monitors that are interfaced with the Access Controls System shall be within their calibration date.

3.9 During operations with beam, the locations of area radiation monitors interfaced with the Access Control System are to be configuration controlled.

Fire Protection

3.10 ~~Appropriate action shall be taken if~~ **During periods of beam operation, the installed** fire detection/protection systems ~~are impaired. These actions may either be to prohibit personnel from working in a specific area and/or to de-energize equipment.~~**shall be operable.**

Authorized Alternative: Within 2 hours of discovery, the Department Chair or designee may allow partial or full inoperability of any fire detection and/or suppression system for up to 80 hours with beam operations if the benefit of continuing beam operations is judged to outweigh the potential risk of fire damage. Operating procedures shall specify the compensatory actions to be taken during inoperability.

3.10.1 In occupied areas, TVDG/TTB equipment may be energized if the smoke detection system for the energized area can transmit an alarm to summon the BNL Fire/Rescue Group. ~~Transmittal may be automatic or via a fire watch.~~

Authorized Alternative: The Operations Coordinator, ESH Coordinator or designee may allow partial or full inoperability of any fire detection system, suppression system or manual alarm station in occupied areas as long as a Fire Watch is posted who can verbally communicate with the BNL Fire/Rescue Group by radio or phone.

Handling and Alerting System for Insulating Gas

3.11 TVDG accelerator tanks - The absolute maximum allowable working pressure for these vessels shall be 300 psig, as per ASME Code Stamp on the vessel.

3.12 The maximum working pressure for the insulating-gas storage-tanks shall be 575 psig.

3.13 The minimum allowable ambient temperature for the insulating-gas storage-tanks location shall be 32 ^{0}F.

3.14 The maximum working pressures for these vessels shall be as follows:

3.14.1 Heat Exchangers: 250 psig @ 300 ^{0}F

3.14.2 Dryer Towers: 250 psig @ 450 ^{0}F, 450 psig @ 250 ^{0}F

3.14.3 Filter Towers: 250 psig @ 100 ^{0}F

3.15 ~~Oxygen~~ **Installed oxygen** monitors that are used to alert against displacement of oxygen by insulating gas leaking into occupied areas shall alarm for oxygen levels below 19.5%.

Authorized Alternative: The Tandem Supervisor or ESH Coordinator may allow personnel oxygen monitors to be used for up to 80 hours while the installed monitors are out of service.

Column Truss Structure

3.16 For MP6, the maximum additional column load that may be added to the original configuration shall be 5000 pounds concentrated at the high voltage terminal.

3.17 For MP7, the maximum additional column load that may be added to the original configuration shall be 3000 pounds concentrated at the high voltage terminal.

Section 4: Engineered Safety Systems Requiring Calibration, Testing, Maintenance, and Inspection

The systems and requirements for calibration, testing, maintenance, accuracy or inspections necessary to ensure the integrity of the TVDG/TTB safety envelope parameters during operations are~~:~~ **given in this section:**

4.1. The Access Control System shall be functionally tested in accordance with requirements in the~~-~~ BNL Radiation Control Manual.

4.2. Accelerator building ventilation exhaust fans shall undergo annual testing (not to exceed 15 months).

4.3. TVDG/TTB fire protection shall undergo annual testing (not to exceed 15 months).

4.4. Area radiation monitors shall undergo annual testing (not to exceed 15 months).

4.5. Radiological barriers shall undergo annual visual inspection (not to exceed 15 months).

4.6. The insulating gas handling system shall undergo annual inspection and testing (not to exceed 15 months).

4.7. The **installed** oxygen monitoring system shall undergo annual inspection and testing (not to exceed 15 months).

Section 5: Administrative Controls

Administrative controls necessary to ensure the integrity of the TVDG/TTB safety envelope parameters during operations are:

5.1. Minimum Main Control Room Staffing

5.1.1. C-A Main Control Room: one Operations Coordinator and one Operator shall be on duty when TTB beam is injecting into Booster. During normal operations, one of the two must remain in the Main Control Room at all times.

Authorized Alternative: If one operator is incapacitated, the remaining operator may continue Collider operations as long as manning requirements are restored within two hours.

5.1.2. TVDG Control Room: two qualified individuals are required for operation of the MP6 and/or MP7 Tandem accelerators. The operator-in-charge must be fully qualified and must be on-duty at the TVDG facility. The second

operator is a person who is judged by the Pre-Injector Group Leader and TVDG Operations Supervisor, or in their absence the TVDG Operations Shift Supervisor, to have sufficient knowledge to assist the operator-in charge. The second operator must be on-duty at the C-A Complex and must have radio communication with the operator-in-charge on-duty at the TVDG.

Authorized Alternative: If the second operator is incapacitated, the operator-in-charge may continue Tandem operations as long as manning requirements are restored within two hours.

5.2. Experiment Area Staffing

5.2.1. The minimum experimental area staffing shall be a qualified TVDG operator for TVDG experimental operations with beam.

5.3. **On-shift** Operations staff shall be trained and qualified on their safety, operational and emergency responsibilities. Records of training and qualification shall be maintained on the Brookhaven Training Management System (BTMS).

5.4. Work planning and control systems shall comply with the requirements in the C-A Operations Procedure Manual.

5.5. Environmental management shall comply with the requirements in the C-A Operations Procedure Manual.

~~Groundwater monitoring well location and frequency of monitoring shall be reviewed periodically and adjusted based on prior measurement results.~~

5.6. Experiment modification and review shall comply with the requirements in the C-A Operations Procedure Manual.

5.6.1. Each experiment in the TVDG Target Rooms shall be reviewed before running with beam.

~~Work on energized electrical systems shall comply with working hot permits and other controls in accord with the requirements in SBMS.~~

~~5.8.~~5.7. Only qualified TVDG facility operators are authorized to operate the Tandem insulating-gas handling system and they shall comply with the requirements in the C-A Operations Procedure Manual.

~~5.9.~~5.8. Modifications of the Tandem insulating-gas handling-system that are known to increase the oxygen deficiency hazard shall be reviewed by the Tandem Safety Committee and the approved by the C-A Accelerator Systems Safety Review Committee.

~~5.10.~~5.9. Modifications involving addition or removal of equipment from the column truss structures of the Tandem accelerators must be reviewed by the C-A Department Chief Mechanical Engineer, or his designee.

5.10 Industrial hazards shall be controlled in accordance with the applicable portions of the BNL SBMS Subject Area.

ATTACHMENT 4 TO LESHC 03-02

~~C-A OPERATIONS PROCEDURES MANUAL~~

Accelerator Safety Envelope

~~2.5 Operational Safety Limits/Accelerator Safety Envelope for AGS, Booster and Linac~~

~~Text Pages 2 through 9~~

Title of Facility: AGS, Booster and Linac

~~Hand Processed Changes~~

Date of Initial ASE: May 30, 2003

~~HPC No.~~	~~Date~~	~~Page Nos.~~	~~Initials~~

Subsequent Revision Dates:

Version of the SAD that the ASE applies to: AGS FSAR, August 11, 1993 and Booster FSAR, February 27, 1991

Signature of Preparer:

_____

Signature of Collider-Accelerator Department Chair:

_____

Signature of High Energy and Nuclear Physics Associate Laboratory Director:

_____

Signature of Deputy Director of Operations:

_____

ASE Contents:

Section 1: Introduction

The ASE Requirements define the conditions, safe boundaries, and the administrative controls necessary to ensure safe AGS, Linac and Booster operations and to reduce the potential risk to the public, workers and environment.

1.1 **The reference to the method used by the Collider-Accelerator Department for change control of the ASE is the BNL Subject Area on Accelerator Safety.**

1.2 **A variation beyond the boundaries described in Sections 1, 2, 3, and 4 of this ASE shall be treated as a violation of the ASE and shall be a reportable occurrence, as defined by the BNL SBMS Subject Area on Occurrence Reporting. A violation is defined as not satisfying a Requirement or its specific Authorized Alternative. C-A Department staff shall make notifications of occurrences according to the requirements in the C-A Operations Procedure Manual.**

1.2.1 **If a Requirement is not satisfied and it has a specific Authorized Alternative, implement the Authorized Alternate or stop the activity that uses the affected equipment within one hour.**

1.3 Emergency actions may be taken that depart from these approved ASE Requirements when no actions consistent with the Requirements are immediately apparent and when these actions are needed to protect the public, worker and environmental safety. These actions shall be approved by the person in charge of facility safety, as defined in the operating procedures, when the emergency occurs and shall be reported to C-AD management within 2-hours.

Section 2: BNL Safety Envelope Limits

This section contains the absolute limits that BNL places on its operations to ensure that we meet the regulatory limits established to protect our environment, public and staff/visitors

and that those operations are conducted within the assumptions of the AGS, Linac and Booster Safety Analyses documented in the AGS FSAR and Booster FSAR. BNL Safety Envelope Limits for AGS, Linac and Booster operations are:

2.1. **Less than 25 mrem in one year to individuals in other BNL Departments or Divisions adjacent to a Collider-Accelerator Department accelerator facility.**

2.2. **Less than 5 mrem in one year to a person located at the site boundary.**

2.3. **Offsite drinking water concentration and on-site potable well water concentration must not result in 4 mrem or greater to an individual in one year.**

2.4. **Less than 1250 mrem in one year to a Collider-Accelerator Department staff member.**

2.5. **Maximum tritium concentration of 10,000 pCi/L in the BNL sanitary sewer effluent, caused by liquid discharges from AGS, Linac and Booster facilities averaged over a 30-day interval.**

2.6. **Groundwater contamination from soil activation shall be prevented and controlled in accordance with the requirements of the BNL SBMS Accelerator Safety Subject Area, Design Practice for Known Beam Loss Locations.**

2.7. **Airborne effluents for AGS, Linac and Booster facilities shall not result in a dose that exceeds 0.1 mrem in one year to a person at the site boundary unless the requirements of the BNL SBMS Subject Area, Radioactive Airborne Emissions are satisfied.**

Section 3: Corresponding AGS, Linac and Booster Safety Envelope Parameters

This section identifies the measurable limitations on critical operating parameters that, in conjunction with the specifically identified hazard control considerations established by the facility design and construction, ensure that AGS, Linac and Booster operations will not exceed the corresponding Safety Envelope Limits discussed in Section 2. These parameters are derived from the safety analyses described in the AGS and Booster FSARs. AGS, Linac and Booster Safety Envelope Parameters are:

AGS, Linac and Booster Particle Limit and Limits on Particle Loss

3.1. **The maximum product of the number of high energy unpolarized protons or polarized protons and particle energy in the Linac shall not exceed 9×10^{17} GeV in one hour.**

3.2 **The maximum product of the number of high energy unpolarized protons, polarized protons or heavy ions and particle energy in the AGS ring shall not exceed 1.1×10^{19} GeV in one hour.**

3.3 **The maximum product of the number of high energy unpolarized protons, polarized protons or heavy ions and particle energy in the Booster ring shall not exceed 5.4 x 10^{17} GeV in one hour.**

Control of Beam Loss

3.4 **Loss monitoring results and radiation survey results shall be used in order to maintain beam loss "As Low As Reasonably Achievable" as defined in the BNL Radiological Control Manual. The following requirements keep the skyshine dose to levels below the limits in 2.1 and 2.2:**

3.4.1 **The measured dose rate on the surface of the AGS Ring shielding above these superperiods shall average less than 1100 mrem/h averaged over 36 weeks of operation. The limiting location is the site boundary.**

~~Approved: _____ _____~~
~~Collider-Accelerator Department Chair Date~~

3.4.2 **The measured dose rate on the roof over Building 914 or the shield above the Booster scraper shall average less than 15 mrem/h averaged over 200 days of operation. The limiting location is Building 931, which belongs to the Medical Department.**

3.4.3 **The measured dose rate on the beam stop surface shall average less than 1300 mrem/h averaged over 20 weeks of operation for a beam stop surface area of 2000 ft^2. The limiting location is the site boundary.**

3.4.4 **Beam loss induced radiation within uncontrolled areas is less than 0.5 mrem in an hour and for chronic losses less than 25 mrem in a year.**

3.4.5 **Beam loss induced radiation in a Controlled Area is less than 5 mrem in an hour and for chronic losses less than 100 mrem in a year.**

~~E. Lessard~~

Classification of Radiological Areas

~~**2.5 Operational Safety Limits/Accelerator Safety Envelope for AGS, Booster and Linac**~~

3.5 **Radiological area classifications shall be in accord with requirements in the BNL Radiation Control Manual.**

~~**Purpose**~~

Access Controls System (ACS)

~~This procedure defines the responsibilities for the Operational Safety Limits (OSLs) for the AGS, Booster and Linac portions of the C-A complex including associated experimental areas in order to provide a safe and healthy workplace, protect the environment, and comply with applicable SBMS requirements.~~

3.6 **The Access Controls System shall be functional during operations with beam.**

~~Separate ASE parameters are provided for the Tandem Van De Graaff (OPM 2.5.1), for the Collider for routine operations (OPM 2.5.2) and for the NASA Space Radiation Laboratory (NSRL) for routine operations (OPM 2.5.3). The Operational Safety Limits (OSLs) and the Accelerator Safety Envelope parameters are equivalent safety limits as indicated in 1.1 and 1.2 below. The Department is on schedule to prepare an ASE and update the SAD for AGS, Linac and Booster by 2005; however, until that time, we retain the use of OSLs and the SAR in place of the ASE parameters and the SAD:~~

3.7 **During the running period, area radiation monitors that are interfaced with the Access Controls System shall be within their calibration date.**

~~1.1 Operational Safety Limits (OSLs) are auditable boundaries of operation, which are not to be exceeded during normal operations to ensure safety. The OSLs define the conditions, safe boundaries and administrative controls to ensure that the Collider-Accelerator complex is operated within the guidelines defined. These OSLs are imposed on ion accelerator operations since there exists the potential to produce conditions that could risk the health and safety of employees, cause substantial damage to facilities and equipment, or damage the environment.~~

3.8 **During the running period, the locations of area radiation monitors interfaced with ACS are to be configuration controlled.**

~~1.2 Accelerator Safety Envelope parameters are a set of physical and administrative conditions based on the ASE approved by DOE that establish the boundaries within which the Collider-Accelerator complex is to be operated in a safe and environmentally sound manner. See DOE Order O 420.2, Accelerator Safety, for additional information.~~

Oxygen Deficiency Hazard (ODH) Control

~~**Responsibilities**~~

3.9 ODH area classification and controls shall in accord with the requirements in the BNL SBMS Subject Area, ODH Classification / Controls.

~~2.1 The Department Chair shall approve all changes to the Operational Safety Limits (OSLs).~~

Fire Protection

~~2.2 The on-duty Operations Coordinator shall follow OSL C-A 1.0, 4.0, 5.0, and 6.0. Written confirmation for any deviation must be obtained from the C-A Department Chair, or Associate Chair for ESHQ, or by the Associate Chair for Operations.~~

3.10 During periods of beam operation, when access to the primary beam areas is prohibited the installed fire detection and suppression systems shall be operable.

~~2.3 The liaison physicists shall follow the OSL C-A 1.0 and 2.0, and shall obtain written confirmation for any deviation from the C-A Radiation Safety Committee.~~

Authorized Alternative: Within 2 hours of discovery, the Department Chair or designee may allow partial or full inoperability of any fire detection and/or suppression system for up to 80 hours with beam operations if the benefit of continuing AGS, Linac or Booster operations is judged to outweigh the potential risk of fire damage. Operating procedures shall specify the compensatory actions to be taken during inoperability.

~~2.4 The Head of the Access Controls Group shall follow the OSL C-A 3.0, and shall obtain written confirmation for any deviation from the C-A Radiation Safety Committee.~~

3.11 During periods of shutdown, and if the facility is to be occupied, either the installed fire detection and suppression systems or the manual fire alarm stations in the occupied areas shall be operable.

~~2.5 The Head of the Access Controls Group or designate shall follow OSL C-A 7.0, and shall obtain written confirmation for any deviation from the C-A Associate Chair for ESHQ.~~

Authorized Alternative: The Operations Coordinator, ESH Coordinator or designee may allow partial or full inoperability of any fire detection system, suppression system or manual alarm station in occupied areas as long as a Fire Watch is posted who can verbally communicate with the BNL Fire/Rescue Group by radio or phone.

~~**Prerequisites**~~

3.12 Personnel may occupy the AGS, Linac or Booster tunnel if the exhaust fans can be activated manually or automatically if required for personnel protection during an emergency.

~~None~~

Authorized Alternative: Restore operability or prevent occupancy in the affected area or empty the building within one hour.

~~**Precautions**~~

Section 4: Engineered Safety Systems Requiring Calibration, Testing, Maintenance, and Inspection

~~None~~

The systems and requirements for calibration, testing, maintenance, accuracy or inspection necessary to ensure the operational integrity of the Safety Envelope Parameters in Section 3 are given in this section:

~~**Procedure**~~

4.1. **Access Controls System (ACS) shall be functionally tested in accordance with requirements in the requirements in the BNL Radiation Control Manual.**

~~Operational Safety Limits have been established for:~~

4.2 **AGS, Linac and Booster fire protection systems shall undergo annual testing (not to exceed 15 months).**

4.3. A~~. Energy flux of beams of unpolarized protons, polarized protons and heavy ions in the AGS, Booster and/or Linac~~**rea radiation monitors shall undergo annual testing (not to exceed 15 months)**.

~~B. Skyshine radiation and activation of ground water.~~

4.4. **Radiological barriers shall undergo annual visual inspection (not to exceed 15 months).**

~~C. C-A Access Control System.~~

4.5. **Rainwater barriers for activated soil shall undergo annual visual inspection (not to exceed 15 months).**

~~D. Fire protection prerequisites in the AGS Ring, Booster and Linac.~~

Section 5: Administrative Controls

~~E. Personnel requirements in the Main Control Room.~~

Administrative controls necessary to ensure the operational integrity of the Safety Envelope Parameters described in Section 3 are:

~~F. Target watch personnel requirements for experimental areas.~~

5.1. **Minimum Main Control Room Staffing**

~~G. Area Radiation (Chipmunk) monitoring system testing and calibration.~~

5.1.1. **C-A Main Control Room: Two Operators shall be on duty for Linac only beam operation and one Operations Coordinator and one Operator shall be on duty for all other beam operations. During normal operations, one of the two must remain in the Main Control Room at all times.**

~~5.1 Energy Flux Operational Safety Limits (OSL-C-A 1.0)~~

Authorized Alternative: If one operator is incapacitated, the remaining operator may continue Collider operations as long as manning requirements are restored within two hours.

~~I. Persons Responsible: Liaison physicists for Linac, Booster or AGS, Operations Coordinators.~~

5.2. **Liquid Hydrogen Target Experiment Staffing**

~~II. Systems requiring limit: The AGS, Booster, Linac, SEB, SBE, and FEB targets.~~

Cryogenic Target Watch: one Cryogenic Section Technician shall be on watch when liquid hydrogen is in use in the experimental area.

~~III. Purpose of limit: to restrict the intensity of radiation fields to on-site areas~~

5.3. **On-shift operations and technician staff shall be trained and qualified on their safety, operational and emergency responsibilities. Records of training and qualification shall be maintained on the Brookhaven Training Management System, (BTMS).**

~~IV. Parameters Limited: Energy flux of protons and heavy ions accelerated (GeV-nucleons/hour). Energy flux of protons on targets.~~

5.4. **Work planning and control systems shall comply with the requirements in the C-A Operations Procedure Manual.**

~~V. Requirements~~

5.5. **Environmental management shall comply with the requirements in with the requirements in the C-A Operations Procedure Manual.**

~~1. Design Features~~

5.6. **Experiment modification and review shall comply with the requirements in the C-A Operations Procedure Manual.**

~~The shielding and active interlock circuitry of the Collider-Accelerator Complex are designed and tested to assure that acceptable radiation levels will not be exceeded at the limiting energy fluxes. Liaison physicists are to be familiar with the physical limits of the machine or target for which they are responsible in order to ensure physical limits are below OSLs.~~

5.6.1. **Each experiment in the Linac, Booster, AGS, AGS Experimental Halls, U- line, V-line and Building 919 shall be reviewed before running with beam.**

~~2. Operational Safety Limits~~

5.7. **Modifications of the AGS, Linac and Booster that are known to increase the oxygen deficiency hazards shall be reviewed and approved by the C-A Accelerator Systems Safety Review Committee.**

~~a. The limit for unpolarized protons, polarized protons and heavy ions in the AGS Ring has been set at $1.1x10^{19}$ GeV-nucleons/hour.~~

5.8. **Industrial hazards shall be controlled in accordance with the applicable portions of the BNL SBMS Subject Area.**

~~b. The limit for unpolarized protons, polarized protons and heavy ions in the Booster has been set at $5.4x10^{17}$ GeV-nucleons/hour.~~

~~c. The limit for unpolarized protons and polarized protons in the Linac has been set at $9x10^{17}$ GeV-nucleons/hour.~~

~~The limits for protons on targets are given in C-A OPM Temporary Procedure, "Procedure to Limit Flux of Protons on Targets". This procedure is reviewed and approved prior to each running period by the C-A RSC Chair and the C-A Associate Chair for ESHQ.~~

~~3. Administrative Controls~~

~~The liaison physicist shall document the physical limit of the machine or target for which he/she is responsible and to ensure the physical limit is below the OSL. The liaison physicist must notify the C-A Department Chair prior to~~

initiating changes to machine configuration that cause one to exceed the OSLs.

5.2 Beam Loss Operational Safety Limits (**OSL-C-A 2.0**)

I. Persons Responsible: Liaison physicists for Linac, Booster, AGS and experimental areas.

II. Systems requiring limit: The accelerators and experimental Areas.

III. Purpose of the limit: to constrain radiation and radioactivity produced by the beam.

IV. Parameter Limited: Dose-equivalent per year at defined locations in the Collider-Accelerator Complex. The corresponding number of lost protons per year is listed as current Limiting Conditions of Operation (LCO). These may change as shielding is upgraded and other advances occur but the Operational Safety Limits reflect current DOE orders.

V. Requirements:

1. Design Features:

Shielding in the C-A Complex requires bounding the maximum beam loss at critical locations because of the radiation hazards, including production of radionuclides in ground water. Radiation detectors throughout the complex are monitored and displayed in the MCR.

2. Safety Limits and Current Limiting Conditions of Operation.

OSL	LCO (protons per year p/y)
5 mrem/y at site boundary lost at A, 25 mrem/y at non-C-A on-site facilities	$7x10^{19}$ p/y at 28 GeV or equivalent F or J superperiods in AGS
	$2.2x10^{19}$ p/y at 1.5 GeV or equivalent stopped at the Booster F6 septum

	~~1.5×10^{20} p/y at 1.5 GeV or equivalent stopped at the Booster beam dump (Note: LCO below is more restrictive and is to be used)~~
~~5 mrem/y at site boundary~~ ~~25 mrem/y at non-C-A on-site facilities~~	~~8.5×10^{12} mrem-cm^2/y on beam stop top surfaces (e.g. 1300 mrem/h for 20 weeks on a roof surface area of 2000 ft^2)~~
~~5 DCG of ^{22}Na in ground water~~	~~2.5×10^{20} p/y at 28 GeV at target caves that have 1.5 m or equivalent heavy concrete between target and soil~~
	~~2.9×10^{19} p/y at 1.5 GeV or equivalent stopped at the dump in Booster~~ ~~Alternatively, soil samples may be used to determine potential for exceeding the 5 DCG ^{22}Na OSL.~~

~~3. Administrative Controls. The liaison physicist or designate reviews cumulative loss data (if available), beam loss monitor data, periodic activation patterns along the beam lines, and radioactivity concentrations in soil samples or from the ground water monitoring program to assure that the limits are not exceeded, restricting beam intensity and/or beam loss as required.~~

~~5.3 High Hazard Access Control System Operational Safety Limits (**OSL-C-A 3.0**)~~

~~I. Persons Responsible: The Head of the Access Controls Group shall ensure that the systems in use are tested and are functional. The on-duty Operations Coordinator shall ensure C-A-OPM-4.1, "C-A Complex Access Control Procedures for Primary Beam Enclosure" is followed.~~

~~II. Systems requiring limit: Linac, Booster, AGS, transfer lines, primary beam lines and beam caves.~~

~~III. Purpose of the limits: To prohibit personnel from entering any area with potential for dose rates greater than 50 rem per hour.~~

IV. Parameters Limited: Functional capacity of the Access Control System, and Primary Beam Accessibility Matrix, C-A-OPM-ATT 4.1.b.

V. Requirements:

1. Design Features:

The system is designed and tested in an ongoing program to assure that all interlocks are functional, and that reach back components provide additional protection to eliminate all potential sources of beam when the system is activated.

2. Safety Limits:

All portions of the Access Control System that are in use must be 100% functional and tested in accord with Appendix 3A of the BNL RadCon Manual.

3. Administrative Controls:

The Access Control System is installed and maintained by a technical group dedicated to this function alone. The group is appropriately trained and all procedures are prescribed in C-A-OPMs. The Radiation Safety Committee controls and checks the functional aspects of all circuitry. Stringent prohibitions are enforced against unauthorizied personnel actions that may alter operation of the access controls. Sweep and reset procedures are performed by trained staff members using procedures in Chapter 4 of the OPM. The Primary Beam Accessibility Matrix, C-A-OPM-ATT 4.1.b, is reviewed and authorized by the Radiation Safety Committee.

5.4 Fire Protection Operational Safety Limits in the C-A Accelerators and Experimental Areas (**OSL-C-A-4.0**)

I. Persons Responsible: The on-duty Operations Coordinator, or a C-A-ES&H Coordinator, shall take appropriate action should he/she be notified by the BNL Fire Rescue Group that both the fire protection and fire detection systems are impaired for a specific area in the AGS, Booster, Linac or associated experimental areas. These actions may either be prohibiting personnel from working in the specific area and/or de-energizing equipment.

II. Systems requiring limit: The sprinkler/standpipe systems in the AGS, Booster and Linac, smoke detectors in the AGS HVAC system, the manual fire alarm stations in the AGS, Booster and Linac.

III. Purpose of the limit: to minimize fire hazard to personnel, equipment and the program.

IV. Parameter Limited: Functional capacity of the required systems.

V. Requirements:

1. Design Features:

The incidence of fire is minimal due to the low flammability of the magnets and cables, and the stringent controls on flammable gases and liquids, including liquid hydrogen. Beam enclosures are concrete for shielding requirements, and are nonflammable.

2. Safety Limits:

a. During periods of beam operation, either the sprinkler/standpipe system or the smoke detectors in the AGS, Booster or Linac HVAC systems, shall be in service.

b. During periods of shutdown, and if the facility is to be occupied, either the sprinkler/standpipe system or the smoke detectors in the AGS, Booster or Linac HVAC systems, or the manual fire alarm stations, shall be in service.

3. Administrative Controls: Maintenance and testing of fire protection and detection systems is described in Facility Use Agreements.

5.5 MCR Personnel Operational Safety Limits (**OSL-C-A 5.0**)

I. Persons Responsible: The on-duty Operations Coordinator shall ensure that the MCR is appropriately staffed during operations.

II. System requiring limit: The AGS, Booster and Linac during running periods.

III. Purpose of the limit: To restrict operation to an adequate number of qualified personnel in the MCR.

IV. Parameters Limited: The minimum number and training of MCR Operators when the accelerators are in operation.

V. Requirements:

1. Design Features:

Not applicable.

2. Safety Limit:

A minimum of 2 qualified operators for Linac only operation, or 1 qualified operator and 1 qualified Operations Coordinator for all other machine operations with particle beam.

3. Administrative Controls:

Operation procedures (see C-A OPM Chapters 1 and 2).

5.6 Target Personnel Operational Safety Limits (**OSL-C-A 6.0**).

I. Persons Responsible: The on-duty Operations Coordinator.

II. System requiring limit: Liquid Hydrogen Targets.

III. Purpose of the limit: To restrict operation to an adequate number of qualified personnel on target watch.

IV. Parameter Limited: The minimum number and training of target watch personnel when liquid hydrogen is in use in the experimental area.

V. Requirements:

1. Design Features:
Not applicable.

2. Safety Limit:
A minimum of 1 qualified Cryogenics Group technician.

3. Administrative Controls:
Operation procedures (C-A-OPMs).

5.7 Chipmunk Monitoring System Calibration and Testing (**OSL-C-A 7.0**)

I. Persons Responsible: The Head of the Access Controls Group or his designate shall ensure that all Chipmunk radiation monitors placed in service during Collider-Accelerator operations are calibrated and tested.

System requiring limit: The Chipmunk Radiation Monitoring System.

III. Purpose of the limit: To assure that the radiation monitoring system is properly calibrated and tested prior to operations.

IV. Parameter Limited: The calibration status of radiation monitors.

V. Requirements:

1. Design Features: Calibration stickers.

2. Safety Limit: All Chipmunk radiation monitors that are in use must be in calibration and be tested.

Administrative Controls: Operations Procedures,

C-A-OPM-8.15.1, "C-A Equipment Calibration Procedure for Chipmunks",
C-A-OPM-8.15.3, "Chipmunk Radiation Monitors",
C-A-OPM-ATT-8.15.3.a "Chipmunk Installation Request Form",

C-A-OPM-8.15.4, "Functional Test of the Chipmunk Computer Interface".

Documentation

None

References

As listed in Sections 1 through 5 of this OPM.

Attachments

None

ATTACHMENT 5 TO LESHC 03-02

Accelerator Safety Envelope

~~Title of Facility: Booster Applications Facility (BAF)~~
Title of Facility: NASA Space Radiation Laboratory (NSRL)

Date of Initial ASE: June 15, 2001

Subsequent Revision Dates: May 30, 2003

Version of the SAD that the ASE applies to: Booster Applications Facility (NSRL) Safety Assessment Document, Revision 1, June 15, 2001

Signature of Preparer:

_____

Signature of Collider-Accelerator Department Chair:

_____

Signature of High Energy and Nuclear Physics Associate Laboratory Director:

_____

Signature of Deputy Director of Operations:

_____

ASE Contents:

Section 1. Introduction

~~General actions to be taken upon discovery of a violation of the Safety Envelope:~~**The ASE Requirements define the conditions, safe boundaries, and the administrative controls necessary to ensure safe NSRL operations and to reduce the potential risk to the public, workers and environment.**

1.1 **The reference to the method used by the Collider-Accelerator Department for change control of the ASE is the BNL Subject Area on Accelerator Safety.**

1.2 A variation beyond the boundaries described in Sections **1,** 2, 3**,** and 4 **of this ASE** shall be treated as a **violation of the ASE and shall be a** reportable occurrence, as defined by **the BNL** SBMS Subject Area on Occurrence Reporting. **A violation is defined as not satisfying a Requirement or its specific Authorized Alternative.** C-A Department staff shall make notifications of occurrences according to the requirements in the C-A Operations Procedure Manual.

1.2.1 ~~The method used by the Collider-Accelerator Department for change control of the ASE is documented in the C-A Operations Procedure Manual.~~ **If a Requirement is not satisfied and it has a specific Authorized Alternative, implement the Authorized Alternate or stop the activity that uses the affected equipment within one hour.**

~~**Section 2: BNL Safety Envelope Limits**~~

1.3 Emergency actions may be taken that depart from these approved ASE Requirements when no actions consistent with the Requirements are immediately apparent and when these actions are needed to protect the public, worker and environmental safety. These actions shall be approved by the person in charge of facility safety, as defined in the operating procedures, when the emergency occurs and shall be reported to C-AD management within 2-hours.

Section 2: BNL Safety Envelope Limits

This section contains the absolute limits that BNL places on its operations to ensure that we meet the regulatory limits established to protect our environment, public and staff/visitors and that those operations are conducted within the assumptions of the ~~BAF~~**NSRL** safety analyses documented in the BAF **(NSRL)** SAD. **Please note that the construction project was referred to as the Booster Applications Facility (BAF) and the operational facility is referred to as the NASA Space Radiation Laboratory (NSRL).** BNL Safety Envelope Limits for ~~BAF~~**NSRL** operations are:

2.1. Less than 25 mrem in one year to individuals in other BNL Departments or Divisions adjacent to this Collider-Accelerator Department accelerator facility.

2.2. Less than 5 mrem in one year to a person located at the site boundary.

2.3. Offsite drinking water concentration and on-site potable well water concentration must not result in 4 mrem or greater to an individual in one year.

2.4. Less than 1250 mrem in one year to a Collider-Accelerator Department staff member.

Maximum tritium concentration of 10,000 pCi/L in the BNL sanitary sewer effluent, caused by liquid discharges from ~~BAF~~**NSRL** facilities averaged over a 30-day interval.

~~**2.6.2.5.** Groundwater contamination from soil activation is to be prevented.~~

~~Airborne effluents from BAF facilities shall not result in a dose that exceeds 0.1 mrem in one year to a person at the site boundary.~~

2.6. **Groundwater contamination from soil activation shall be prevented and controlled in accordance with the requirements of the BNL SBMS Accelerator Safety Subject Area, Design Practice for Known Beam Loss Locations.**

~~**Section 3: Corresponding BAF Safety Envelope Parameters**~~

2.7. **Airborne effluents from NSRL facilities shall not result in a dose that exceeds 0.1 mrem in one year to a person at the site boundary unless the requirements of the BNL SBMS Subject Area, Radioactive Airborne Emissions are satisfied.**

~~This section identifies the measurable limitations on critical operating parameters that, in conjunction with the specifically identified hazard control considerations established by the facility design and construction, ensure that BAF operations will not exceed the corresponding BAF Safety Envelope Limits discussed in Section 2. These parameters are derived from the safety analyses described in Chapter 4 of the BAF SAD. BAF safety envelope parameters are:~~

Section 3: Corresponding NSRL Safety Envelope Parameters

This section identifies the measurable limitations on critical operating parameters that, in conjunction with the specifically identified hazard control considerations established by the facility design and construction, ensure that NSRL operations will not exceed the corresponding Safety Envelope Limits discussed in Section 2. These parameters are derived from the safety analyses described in the BAF **SAD. NSRL safety envelope parameters are:**

NSRL Beam Limits in Terms of the Product of Nucleon Energy and Flux

3.1. The annual limit on the number and kinetic energy of high-energy nucleons extracted from the Booster SEB system shall be no greater than 10^{17} GeV in one year.

3.2. The hourly limit on the number and kinetic energy of high-energy nucleons extracted from the Booster SEB system shall be no greater than $6x10^{14}$ GeV in one hour.

3.3. The hourly limit on the number and kinetic energy of high-energy nucleons entering the ~~BAF~~NSRL Target Room and beam stop shall be no greater than $6x10^{14}$ GeV in one hour.

3.4. The maximum annual high-energy flux on the ~~BAF~~NSRL beam stop shall be no greater than $3x10^{16}$ GeV in one year.

Control of Beam Loss

3.5. Loss monitoring results and radiation survey results shall be used in order to maintain beam loss "As Low as Reasonably Achievable" as defined in the BNL Radiological Manual.

3.6. Beam loss induced radiation within uncontrolled areas is to be less than 0.5 mrem in an hour and for repeated losses less than 25 mrem in a year.

3.7. Beam loss induced radiation in an occupied Controlled Area is to be less than 5 mrem in an hour and for repeated losses less than 100 mrem in a year.

Classification of Radiological Areas

3.8. Radiological area classifications during operations shall be in accord with requirements in the BNL Radiation Control Manual.

Access Controls

3.9. The Access Controls System shall be functional during operations with beam.

3.10 During the running period, area radiation monitors that are interfaced with the Access Controls System shall be within their calibration date.

3.11 During the running period, the locations of area radiation monitors interfaced with the Access Control System are to be configuration controlled.

Fire Protection

~~Appropriate action shall be taken if fire detection/protection systems are impaired. These actions may either be to prohibit personnel from working in a specific area and/or to de-energize equipment.~~

3.12 **During periods of beam operation, when access to the primary beam areas is prohibited the installed fire detection and suppression systems shall be operable.**

~~BAF magnets and power supplies may be energized if the smoke detection system for the energized area can transmit an alarm to summon the BNL Fire/Rescue Group. Transmittal may be automatic or via a fire watch.~~

Authorized Alternative: Within 2 hours of discovery, the Department Chair or designee may allow partial or full inoperability of any fire detection and/or suppression system for up to 80 hours with beam operations if the benefit of continuing NSRL operations is judged to outweigh the potential risk of fire damage. Operating procedures shall specify the compensatory actions to be taken during inoperability.

~~**Section 4: Engineered Safety Systems Requiring Calibration, Testing, Maintenance, and Inspection**~~

3.13 NSRL magnets and power supplies may be energized if the smoke detection system for the energized area can transmit an alarm to summon the BNL Fire/Rescue Group.

~~The systems and requirements for calibration, testing, maintenance, accuracy or inspections necessary to ensure the integrity of the BAF safety envelope parameters during operations are:~~ **Authorized Alternative: The Operations Coordinator, ESH Coordinator or designee may allow partial or full inoperability of any fire detection system, suppression system or manual alarm station in occupied areas as long as a Fire Watch is posted who can verbally communicate with the BNL Fire/Rescue Group by radio or phone.**

Section 4: Engineered Safety Systems Requiring Calibration, Testing, Maintenance, and Inspection

The systems and requirements for calibration, testing, maintenance, accuracy or inspections necessary to ensure the integrity of the NSRL safety envelope parameters during operations are given in this section:

4.1. The Access Control System shall be functionally tested in accordance with requirements in the BNL Radiation Control Manual.

4.2. Target Room and Support Building ventilation exhaust fans shall undergo annual testing (not to exceed 15 months).

4.3. ~~BAF~~**NSRL** fire protection shall undergo annual testing (not to exceed 15 months).

4.4. Area radiation monitors shall undergo annual testing (not to exceed 15 months).

4.5. Radiological barriers shall undergo annual visual inspection (not to exceed 15 months).

4.6. Rainwater barriers for activated soil shall undergo annual visual inspection (not to exceed 15 months).

4.7. In the Support Laboratories, Class II Type A biological-safety-cabinet (BSC) HEPA-filter efficiency and cabinet face-velocity-tests shall be performed *in situ* at the time of installation, at any time the BSC is moved, and at least annually thereafter (not to exceed 15 months).

4.8. In the Support Laboratories, HEPA filter efficiency shall be tested for the exhaust from animal rooms annually (not to exceed 15 months).

Section 5: Administrative Controls

Administrative controls necessary to ensure the integrity of the ~~BAF~~**NSRL** safety envelope parameters during operations are:

5.1. Minimum Main Control Room Staffing

5.1.1. C-A Main Control Room: one Operations Coordinator and one Operator shall be on duty when ~~BAF~~**NSRL** beam is in operation. During normal operations, one of the two must remain in the Main Control Room at all times.

Authorized Alternative: If one operator is incapacitated, the remaining operator may continue Collider operations as long as manning requirements are restored within two hours.

5.2. Experiment Area Staffing

5.2.1. The minimum experimental area staffing shall be a qualified Collider Accelerator Support (CAS) watch person for ~~BAF~~**NSRL** experimental operations with beam.

5.3. ~~Operations~~**On-shift operations** staff shall be trained and qualified on their safety, operational and emergency responsibilities. Records of training and qualification shall be maintained on the Brookhaven Training Management System (BTMS).

5.4. Work planning and control systems shall comply with the requirements in the C-A Operations Procedure Manual.

5.5. Environmental management shall comply with the requirements in the C-A Operations Procedure Manual.

~~Monitoring well location and frequency of monitoring shall be reviewed periodically and adjusted based on prior measurement results.~~

5.6. Experiment modification and review shall comply with the requirements in the C-A Operations Procedure Manual.

5.6.1. Each experiment in the ~~BAF~~**NSRL** Target Room shall be reviewed before running with beam. It is noted that an experiment may lie dormant for a period greater than one year between runs and not require a review during the dormancy period. For experiments that may run more than once within a 12-month period, review shall occur before each singular scheduled run.

~~Work on energized electrical systems shall comply with working hot permits and other controls in accord with the requirements in SBMS.~~

5.7 Industrial hazards shall be controlled in accordance with the applicable portions of the BNL SBMS Subject Area.

~~High noise areas at BAF shall be evaluated in accord with requirements in SBMS.~~

ATTACHMENT 6 TO LESHC 03-02

Accelerator Safety Envelope

Title of Facility: Relativistic Heavy Ion Collider

Date of Initial ASE: June 3, 1999

Subsequent Revision Dates: September 19, 2000 ~~and~~ , September 27, 2002 and May 30, 2003

Version of the SAD that the ASE applies to: RHIC SAD, Revision 1, August 30, 1999

Signature of Preparer~~(s):~~:

_____

Signature of Collider-Accelerator Department Chair:

_____

Signature of ~~Collider~~High Energy and Nuclear Physics Associate Laboratory Director:

_____

Signature of Deputy Director of Operations:

_____

ASE Contents:

Section 1. Introduction

~~General actions to be taken upon discovery of a violation of the Safety Envelope:~~

The ASE Requirements define the conditions, safe boundaries, and the administrative controls necessary to ensure safe Collider operations and to reduce the potential risk to the public, workers and environment.

1.1 **The reference to the method used by the Collider-Accelerator Department for change control of the ASE is the BNL Subject Area on Accelerator Safety.**

1.2 A variation beyond the boundaries described ~~below~~**in Sections 1, 2, 3, and 4 of this ASE** shall be treated as a **violation of the ASE and shall be a** reportable occurrence, as defined by **the BNL** SBMS Subject Area on Occurrence Reporting. **A violation is defined as not satisfying a Requirement or its specific Authorized Alternative.** C-A Department staff shall make notifications of occurrences according to the requirements in the C-A Operations Procedure Manual.

1.2.1 ~~The reference to the method used by the Collider-Accelerator Department for change control of the ASE is the C-A Operations Procedure Manual.~~ **If a Requirement is not satisfied and it has a specific Authorized Alternative, implement the Authorized Alternate or stop the activity that uses the affected equipment within one hour.**

1.3 Emergency actions may be taken that depart from these approved ASE Requirements when no actions consistent with the Requirements are immediately apparent and when these actions are needed to protect the public, worker and environmental safety. These actions shall be approved by the person in charge of facility safety, as defined in the operating procedures, when the emergency occurs and shall be reported to C-AD management within 2-hours.

Section 2: BNL Safety Envelope Limits

This section contains the absolute limits that BNL places on its operations to ensure that we meet the regulatory limits established to protect our environment, public and staff/visitors and that those operations are conducted within the assumptions of the RHIC

Safety Analyses documented in the RHIC SAD. BNL Safety Envelope Limits for Collider operations are:

2.1. Less than 25 mrem in one year to individuals in other BNL Departments or Divisions adjacent to a Collider-Accelerator Department accelerator facility.

2.2. Less than 5 mrem in one year to a person located at the site boundary.

2.3. Offsite drinking water concentration and on-site potable well water concentration must not result in 4 mrem or greater to an individual in one year.

2.4. Less than 1250 mrem in one year to a Collider-Accelerator Department staff member.

2.5. Maximum tritium concentration of 10,000 pCi/L in the BNL sanitary sewer effluent, caused by liquid discharges from Collider facilities averaged over a 30-day interval.

2.6. Groundwater contamination from soil activation ~~is to~~ **shall** be prevented~~.~~ **and controlled in accordance with the requirements of the BNL SBMS Accelerator Safety Subject Area, Design Practice for Known Beam Loss Locations.**

2.7. **Airborne effluents from** Collider facilities ~~airborne effluents~~ shall not result in a dose that exceeds 0.1 mrem in one year to a person at the site boundary **unless the requirements of the BNL SBMS Subject Area, Radioactive Airborne Emissions are satisfied**.

Section 3: Corresponding Collider Safety Envelope Parameters

This section identifies the measurable limitations on critical operating parameters that, in conjunction with the specifically identified hazard control considerations established by the facility design and construction, ensure that Collider operations will not exceed the corresponding Collider Safety Envelope Limits discussed in Section 2. These parameters are derived from the safety analyses described in the RHIC SAD. Collider Safety Envelope Parameters are:

Collider Particle Limit and Limits on Particle Loss

3.1. The maximum number of heavy ions in each ring shall not exceed the equivalent of 2.4×10^{11} Au ions at 100 GeV/u.

3.2. The maximum number of protons in each ring shall not exceed the equivalent of 2.4×10^{13} at 250 GeV.

~~Loss monitoring results and radiation survey results shall be used in order to maintain beam loss "As Low As Reasonably Achievable" as defined in the BNL Radiological Manual.~~

~~Control BNL Site radiation levels such that:~~

~~**Beam loss induced radiation within uncontrolled areas is less than 0.5 mrem in an hour or for chronic losses less than 100 mrem in a year.**~~**Control of Beam Loss**

3.3. **Loss monitoring results and radiation survey results shall be used in order to maintain beam loss "As Low As Reasonably Achievable" as defined in the BNL Radiological Control Manual.**

3.4 Beam loss induced radiation within uncontrolled areas is less than 0.5 mrem in an hour and for repeated losses less than 25 mrem in a year.

3.5 Beam loss induced radiation in a Controlled Area is less than 5 mrem in an hour **and for repeated losses less than 100 mrem in a year**.

Classification of Radiological Areas

3.6 Radiological area classifications shall be in accord with requirements in the BNL Radiation Control Manual.

Particle Accelerator Safety System (PASS)

3.7 The Access Controls System shall be functional during operations with beam.

3.8 ~~Area~~**During the running period, area** radiation monitors that are interfaced with the Access Controls System shall be within their calibration date.

3.9 High intensity proton beam is to be prevented from the W line either by the Access Controls System or by lock out / tag out of appropriate critical devices.

~~The~~**3.10 During the running period, the** locations of area radiation monitors interfaced with PASS are to be configuration controlled.

Oxygen Deficiency Hazard (ODH) Control

3.11 ODH area classification and controls shall in accord with the requirements in the BNL SBMS Subject Area, ODH Classification / Controls.

Fire Protection

~~Appropriate action shall be taken if fire detection/protection systems are impaired. These actions may either be to prohibit personnel from working in a specific area and/or to de-energize equipment.~~

3.12 During periods of beam operation, when access to the Collider primary beam areas is prohibited the installed fire detection and suppression systems shall be operable.

~~Collider magnets and power supplies may be energized if the smoke detection system for the energized area can transmit an alarm to summon the BNL Fire/Rescue Group. Transmittal may be automatic or via a fire watch.~~

Authorized Alternative: Within 2 hours of discovery, the Department Chair or designee may allow partial or full inoperability of any fire detection and/or suppression system for up to 80 hours with beam operations if the benefit of continuing Collider operations is judged to outweigh the potential risk of fire damage. Operating procedures shall specify the compensatory actions to be taken during inoperability.

3.13 During periods of shutdown, and if the facility is to be occupied, either the installed fire detection and suppression systems or the manual fire alarm stations in the occupied areas shall be operable.

Authorized Alternative: The Operations Coordinator, ESH Coordinator or designee may allow partial or full inoperability of any fire detection system, suppression system or manual alarm station in occupied areas as long as a Fire Watch is posted who can verbally communicate with the BNL Fire/Rescue Group by radio or phone.

3.14 Personnel may occupy the tunnel if the exhaust fans can be activated manually or automatically~~.~~ **if required for personnel protection during an emergency.**

Authorized Alternative: Restore operability or prevent occupancy in the affected area or empty the building within one hour.

STAR Experiment

3.15 The following are required whenever flammable gas is in the integrated detector positioned in the intersecting region (IR):

3.15.1 Flammable gas detection systems, both STAR and PASS, shall be operational.

Authorized Alternative: Within 2 hours of discovery and if requested by the Experimental Shift Leader, the Department Chair or designee may allow partial or full inoperability of any one of the two flammable gas detection

systems for up to 8 hours with flammable gas present if the benefit of continuing detector operations is judged to outweigh the potential risk of STAR experiment damage. Operating procedures shall specify the compensatory actions to be taken during inoperability.

3.15.2 If the SVT is operational, then the detector ventilation system shall be delivering flow.

Authorized Alternative: Within 2 hours of discovery and if requested by the Experiment Shift Leader, the Department Chair or designee may allow detector ventilation system failure for up to 8 hours with flammable gas present if the benefit of continuing detector operations is judged to outweigh the potential risk of STAR experiment damage. Operating procedures shall specify the compensatory actions to be taken during inoperability.

3.15.3 At least one of the two emergency exhaust fans that are connected to PASS shall be operable.

3.15.4 A quantity of purge gas shall be maintained to dilute the detector flammable gas volumes below 25% of the Lower Explosive Limit**.**

3.15.5 Purge gas operational requirements shall be defined in approved STAR Operating Procedures for the detector.

3.15.6 The TPC gas used in the detector shall be P-10 or equivalent hazard. The Collider-Accelerator Department shall approve equivalent hazardous gases prior to use.

3.15.7 When the TPC is in operation, no more than 80 cubic meters of methane gas at STP shall be attached to the gas mixing system.

3.15.8 When electronics are powered in the integrated detector in or out of the IR the Highly Sensitive Smoke Detection (HSSD) system on the detector or the ceiling-level HSSD system shall be operational.

PHENIX Experiment

3.16The following are required whenever flammable gas is in the integrated detector positioned in the intersecting region (IR):

3.16.1 Flammable gas detection systems, both PHENIX and PASS, shall be operational.

Authorized Alternative: Within 2 hours of discovery and if requested by the Experiment Shift Leader, the Department Chair or designee may allow

partial or full inoperability of any one of the two flammable gas detection systems for up to 8 hours with flammable gas present if the benefit of continuing detector operations is judged to outweigh the potential risk of PHENIX experiment damage. Operating procedures shall specify the compensatory actions to be taken during inoperability.

3.16.2 At least one of the two emergency exhaust fans that are connected to PASS shall be operable OR the building HVAC ventilation shall be delivering flow.

3.16.3 A quantity of purge gas shall be available to dilute the detector flammable gas volumes below 25% of the Lower Explosive Limit.

3.16.4 Purge gas operational requirements shall be defined in the approved PHENIX Operating Procedures for the detector.

3.16.5 The detector and ceiling level HSSD systems shall be operational. ~~Alternatively, ASE 3.12 may be used.~~

Authorized Alternative: If requested by the Experiment Shift Leader, the Operations Coordinator, ESH Coordinator or designee may allow partial or full inoperability of both HSSD systems as long as a Fire Watch is posted who can verbally communicate with the BNL Fire/Rescue Group by radio or phone.

3.16.6 The PHENIX High Capacity Ventilation System shall be operational before introduction of flammable gas into the RICH.

3.16.7 The interstitial space between the RICH and the Pad Chamber FEE shall be inerted when introduction of flammable gas is in the RICH.

3.17 Whenever electronics are powered in the integrated detector in or out of the IR:

3.17.1 The electronics racks interlocks in the IR shall be operational.

Authorized Alternative: Within one hour of discovery, de-energize the integrated detector electronics.

3.17.2 The Highly Sensitive Smoke Detection (HSSD) system on the detector or the ceiling-level HSSD system shall be operational.

3.18 If the IR is occupied by personnel after flammable gas is present, then both the personnel plug door and the emergency escape labyrinth shall be available for egress.

Experiments In General

3.19 During shutdown periods when MCR is not staffed, specific safety requirements for the experiments shall be reviewed on a case-by-case basis by the C-AD Experimental Safety Review Committee and approved by the C-AD Department Chair.

Section 4: Engineered Safety Systems Requiring Calibration, Testing, Maintenance, and Inspection

The systems and requirements for calibration, testing, maintenance, accuracy or inspection necessary to ensure the operational integrity of the Collider Safety Envelope Parameters in Section 3 are **given in this section**:

4.1. Particle Accelerator Safety System (PASS) shall be functionally tested in accordance with requirements in the requirements in the BNL Radiation Control Manual.

4.2. ODH ventilation fans and air inlet louvers that are signaled by the PASS shall be functionally tested **annually or** before the running period. Accessible fans and air inlet louvers shall be manually tested semiannually (not to exceed 8 months) or within one month of accessibility

4.3. STAR Highly Sensitive Smoke Detection (HSSD) systems shall undergo annual testing (not to exceed 15 months).

4.4. STAR Flammable Gas Detection System shall undergo annual testing (not to exceed 15 months).

4.5. STAR emergency exhaust fans shall undergo annual testing (not to exceed 15 months).

4.6. Collider fire protection shall undergo annual testing (not to exceed 15 months).

4.7. PHENIX Highly Sensitive Smoke Detection (HSSD) systems shall undergo annual testing (not to exceed 15 months).

4.8. PHENIX Flammable Gas Detection System shall undergo annual testing (not to exceed 15 months).

4.9. PHENIX emergency exhaust-fans shall undergo annual testing (not to exceed 15 months).

4.10 PHENIX High Capacity Ventilation System shall undergo annual testing (not to exceed 15 months).

4.11 PHENIX electronics racks interlocks in the IR shall undergo annual testing (not to exceed 15 months).

4.12 Area radiation monitors shall undergo annual testing (not to exceed 15 months).

4.13 Radiological barriers shall undergo annual visual inspection (not to exceed 15 months).

4.14 Rainwater barriers for activated soil shall undergo annual visual inspection (not to exceed 15 months).

Section 5: Administrative Controls

Administrative controls necessary to ensure the operational integrity of the Collider Safety Envelope Parameters described in Section 3 are:

5.1. Minimum Main Control Room Staffing

5.1.1. C-A Main Control Room: one Operations Coordinator and one Operator shall be on duty when beam is in operation. During normal operations, one of the two must remain in the Main Control Room at all times.

Authorized Alternative: If one operator is incapacitated, the remaining operator may continue Collider operations as long as manning requirements are restored within two hours.

5.2. Cryogenic Control Room Staffing

5.2.1. Cryogenic Control Room: one Cryogenic Shift Supervisor or designee and one qualified Cryogenic Operator shall be on watch when the refrigerator is in operation. One of the two must remain in the Cryogenic Control Room at all times unless controls in the Cryogenic Control Room are relocated to the Main Control Room or unless emergency conditions require actions to be taken by all cryogenic watch standers.

Authorized Alternative: If one operator is incapacitated, the remaining operator may continue Collider operations as long as manning requirements are restored within two hours.

5.3. STAR and PHENIX Staffing

5.3.1. Watch: a qualified local watch is required when flammable gas is in the PHENIX detector in the IR.

5.3.2. Watch: a qualified local watch is required when flammable gas is in the STAR detector in the IR.

5.3.3. PHENIX Experimental Area: one Experiment Shift Leader is required for experimental operations with beam.

5.3.4. STAR Experimental Area: one Experiment Shift Leader is required for experimental operations with beam**.**

5.4. ~~Operations~~**On-shift operations** staff shall be trained and qualified on their safety, operational and emergency responsibilities. Records of training and qualification shall be maintained on the Brookhaven Training Management System, (BTMS).

5.5. Work planning and control systems shall comply with the requirements in the C-A Operations Procedure Manual.

5.6. Environmental management shall comply with the requirements in with the requirements in the C-A Operations Procedure Manual.

5.7. Experiment modification and review shall comply with the requirements in ~~with~~ the ~~requirements in the~~ C-A Operations Procedure Manual.

5.7.1. **Each experiment in the Collider shall be reviewed before running with beam.**

5.8. **Modifications of the Collider that are known to increase the oxygen deficiency hazards shall be reviewed and approved by the C-A Accelerator Systems Safety Review Committee.**

5.10 Industrial hazards shall be controlled in accordance with the applicable portions of the BNL SBMS Subject Area.

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BROOKHAVEN
NATIONAL LABORATORY

August 5, 2003

Mr. Michael D. Holland
Manager, Brookhaven Area Office
U.S. Department of Energy
Building 464
Upton, NY 11973

Subject: Recommendation for Approval of the Proposed C-AD Accelerator Safety Envelope (ASE) Modifications

Dear Mr. Holland:

Attached for your review and approval are proposed modifications to the BNL Collider-Accelerator Department's Accelerator Safety Envelope which includes 1) Tandem Van de Graaff/Tandem to Booster Transfer Line (TVDG/TTB) ASE; 2) Alternating Gradient Synchrotron (AGS), Booster and Linac ASE; 3) NASA Space Radiation Laboratory (NSRL) ASE; and 4) Relativistic Heavy Ion Collider (RHIC) ASE. A memo provided by the Laboratory Environment, Safety & Health Committee (LESHC) supporting this request for approval is attached.

If you have any questions, please contact Ed Lessard on X4250.

Sincerely yours,

Thomas R. Sheridan
Deputy Director, Operations

TRS/lim

Attachment:
Memo dated 7/18/03, E. Lessard (LESHC Chair) to T. Sheridan

cc: M. Butler
E. Lessard ✓
D. Lowenstein
S. Ozaki